Electronic Appendices

Hanushek, Eric A., Jacob Light, Paul E. Peterson, Laura M. Talpey, and Ludger Woessmann. forthcoming. "Long-run Trends in the U.S. SES-Achievement Gap." *Education Finance and Policy*.

Figure A1. Achievement Gaps in Math and Reading between Top and Bottom Quartiles of the SES Distribution

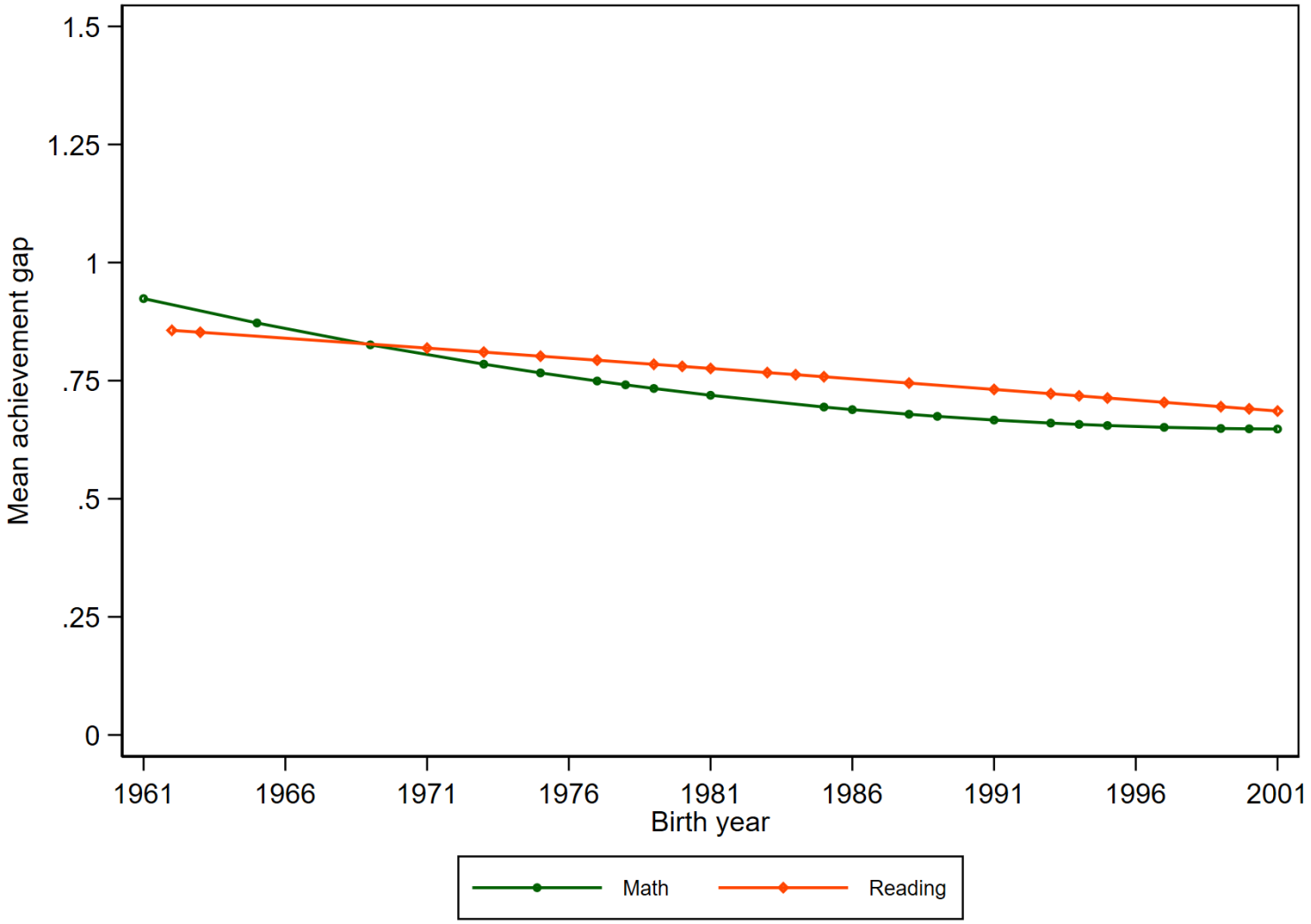


Figure A2. Achievement Gaps between Top and Bottom Quartiles of the SES Distribution, Excluding Each Test Regime

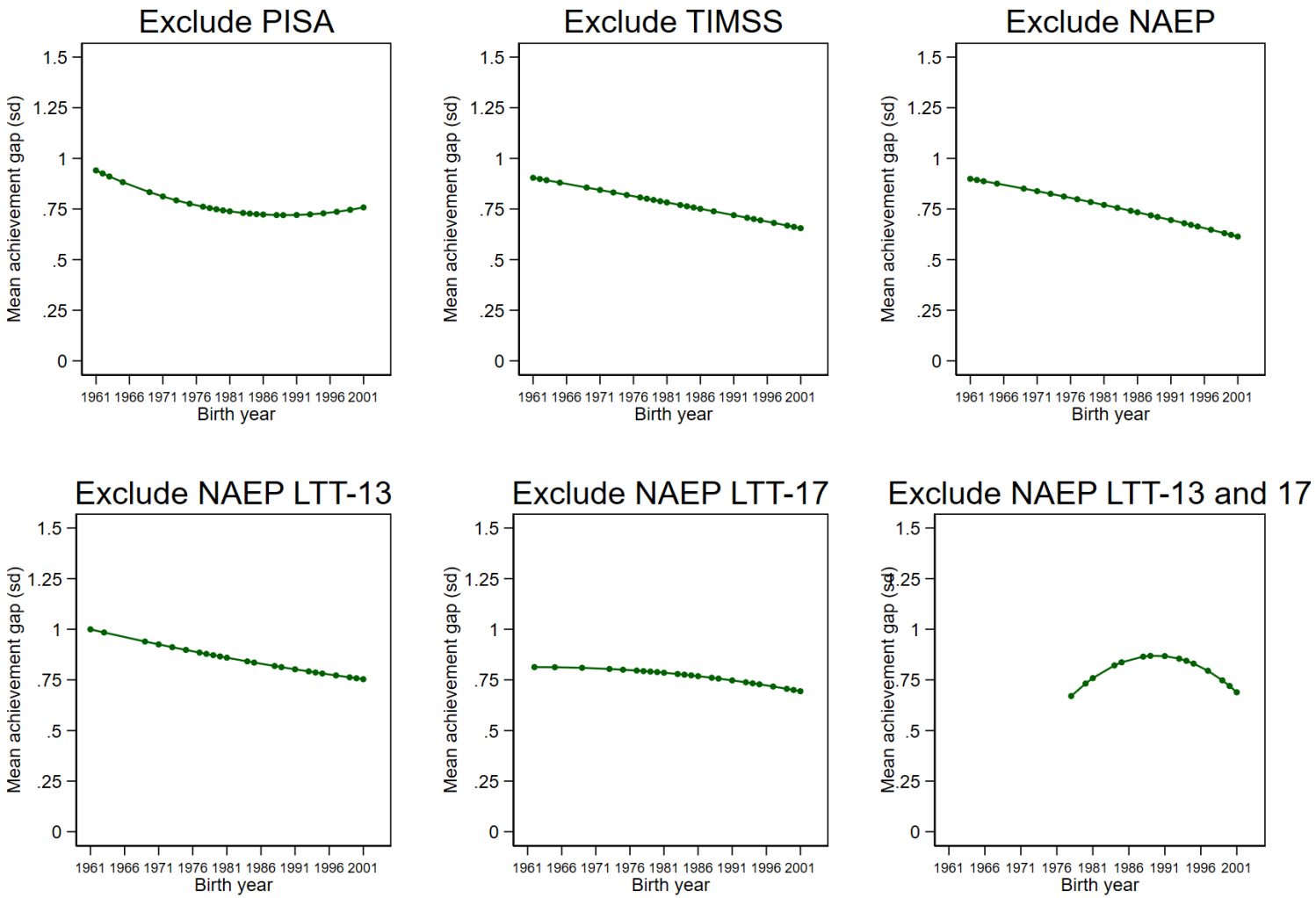


Figure A3. Achievement Gaps for Top and Bottom Quartiles of the SES Distribution Compared to Above and Below the Median

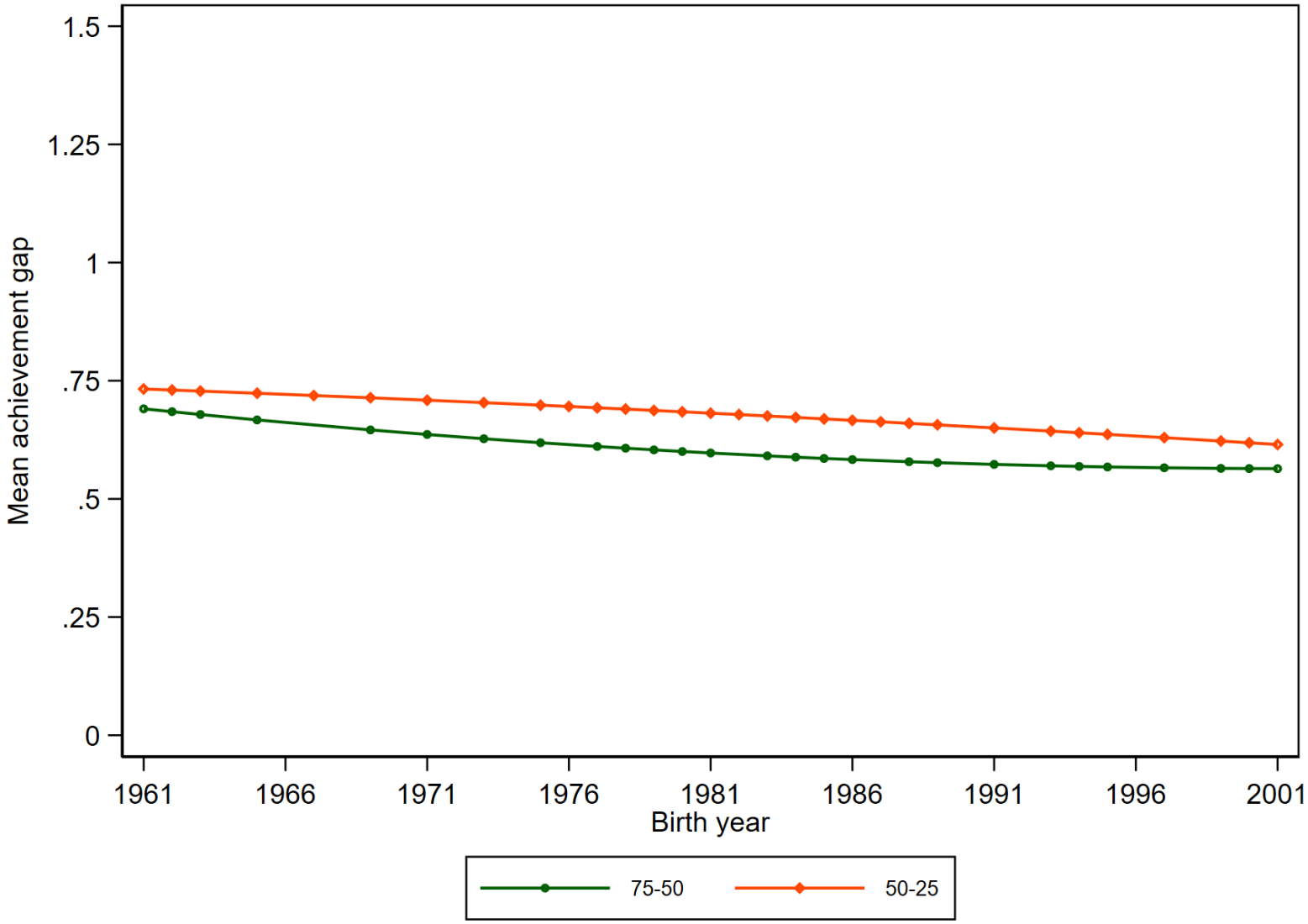


Figure A4. Point Estimation of Achievement Gaps at 75-25, 70-30, and 90-10 Percentiles of SES Distribution

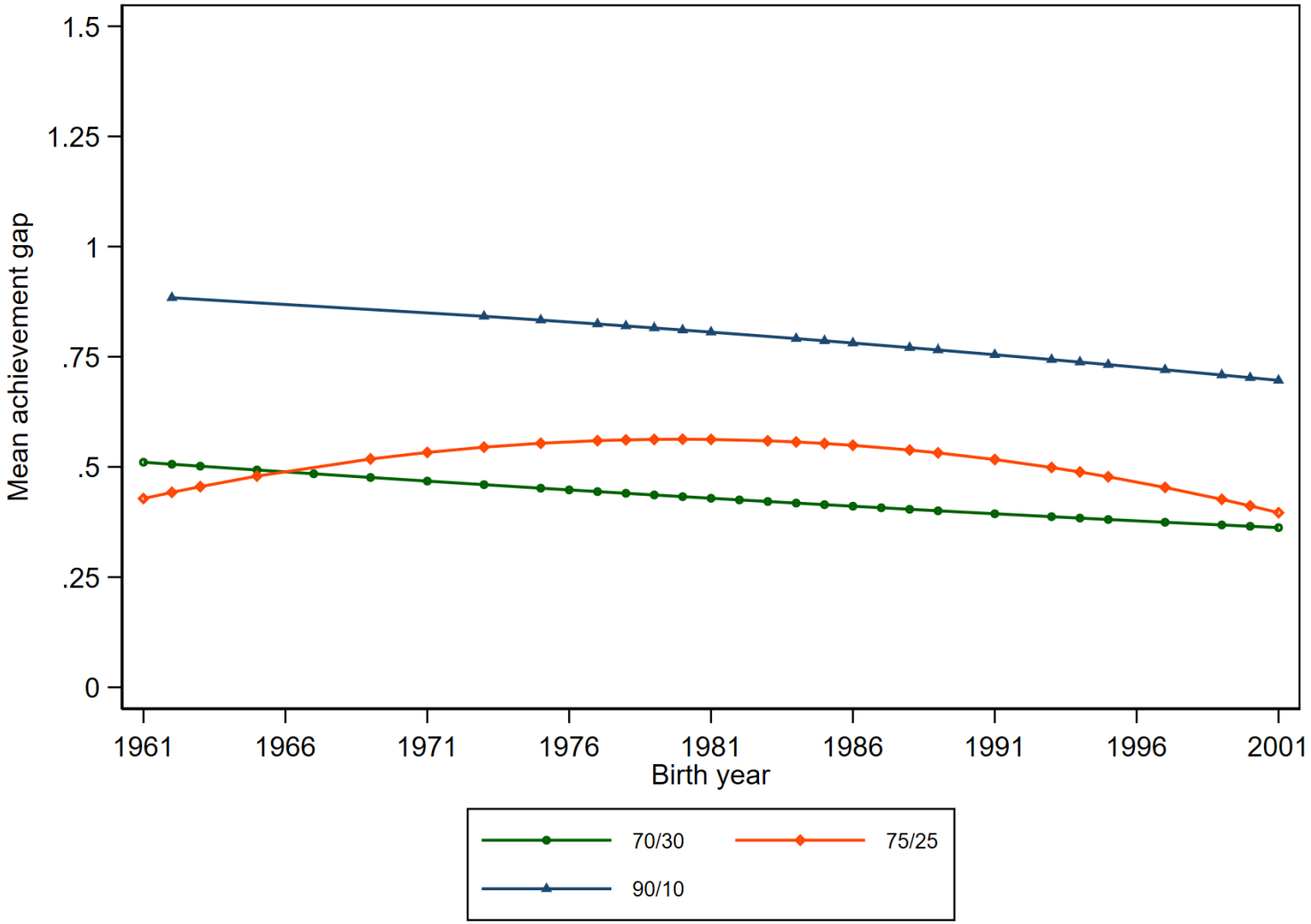
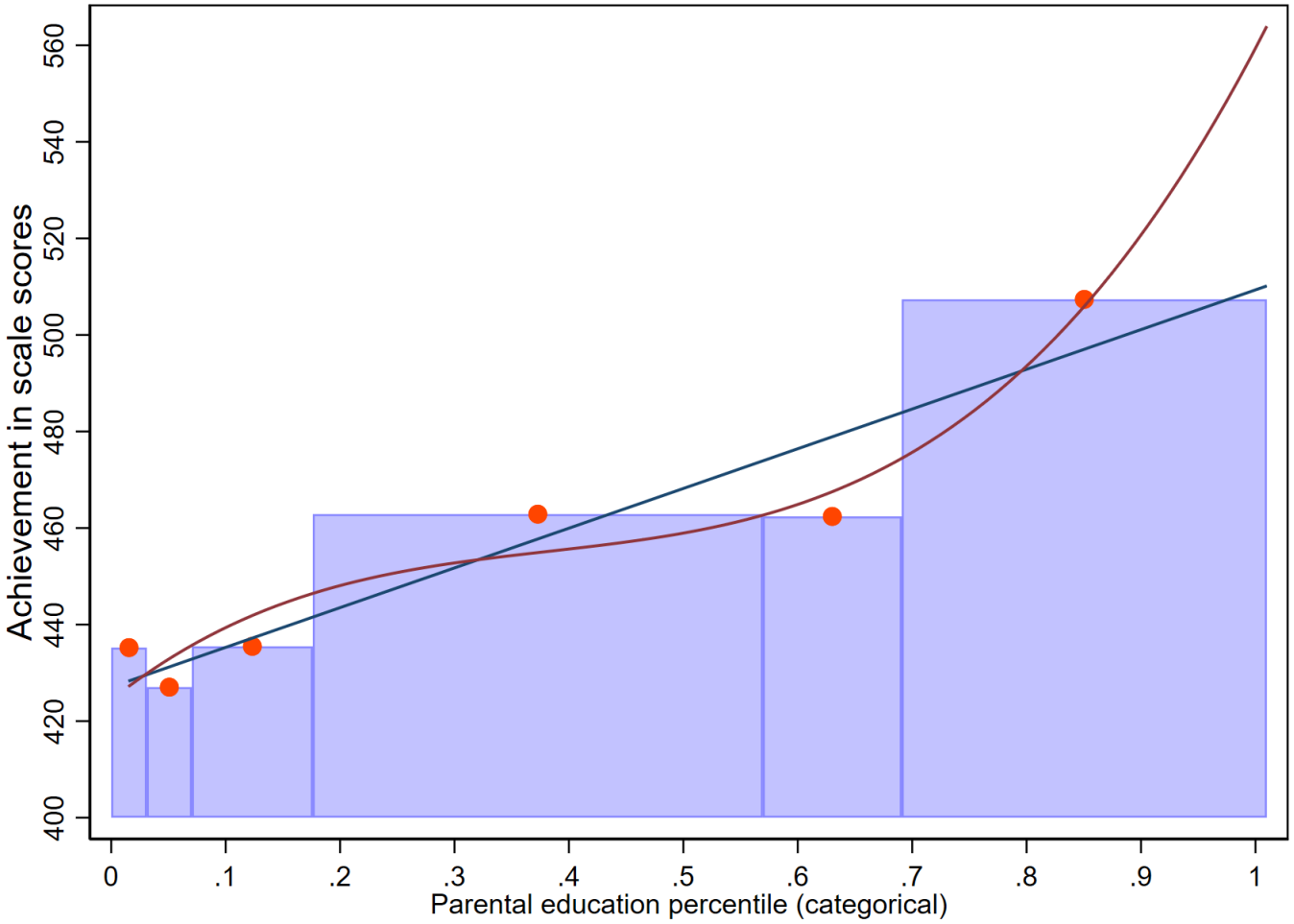


Figure A5. Projection of Achievement at the 90th Percentile with Parental Education from PISA 2015, Linear and Cubic



Notes: Average scores by SES category (percentiles of the discrete values of the respective underlying SES measure) with respective category midpoints and linear and cubic regression predictions.

Table A1. Details of Estimated Trends in SES-Achievement Gaps

Assessment comparisons	n	α_1 (s.e.)	α_2 (s.e.)	F[a] (p-value)	$\alpha_1 \mid \alpha_2 = 0$ [b] (s.e.)
Preferred 75-25 SES gaps	77	-0.0087 (0.0078)	0.0001 (0.0001)	5.393 (0.007)	-0.0053 (0.0016)
Reading	30	-0.0040 (0.0122)	0.0000 (0.0002)	1.393 (0.268)	-0.0044 (0.0026)
Math	35	-0.0166 (0.0103)	0.0002 (0.0002)	4.728 (0.017)	-0.0060 (0.0021)
Excluding individual assessments					
Exclude PISA	60	-0.0156 (0.0055)	0.0277 (0.0117)	4.950 (0.011)	-0.0032 (0.0016)
Exclude TIMSS	65	-0.0060 (0.0061)	-0.0006 (0.0131)	6.243 (0.004)	-0.0062 (0.0017)
Exclude Main-NAEP	61	-0.0057 (0.0056)	-0.0035 (0.0119)	10.013 (0.000)	-0.0072 (0.0016)
Exclude LTT-NAEP	45	0.0339 (0.0107)	-0.1436 (0.0401)	7.268 (0.002)	-0.0033 (0.0029)
Exclude NAEP LTT-17	62	0.0001 (0.0078)	-0.0080 (0.0155)	1.884 (0.162)	-0.0038 (0.0020)
Exclude NAEP LTT-13	60	-0.0079 (0.0071)	0.0042 (0.0139)	4.340 (0.018)	-0.0058 (0.0020)
Alternative gap definitions					
75-50 SES-achievement gap	77	-0.0075 (0.0069)	0.0001 (0.0001)	1.962 (0.148)	-0.0027 (0.0014)
50-25 SES-achievement gap	93	-0.0018 (0.0053)	0.0000 (0.0001)	3.783 (0.027)	-0.0030 (0.0011)
70-30 SES-achievement gap	89	-0.0022 (0.0062)	0.0000 (0.0001)	3.283 (0.043)	-0.0034 (0.0013)
90-10 SES-achievement gap	52	0.0018 (0.0171)	-0.0001 (0.0002)	4.350 (0.019)	-0.0081 (0.0028)
Testing period					
After 1990	68	0.0078 (0.0081)	-0.0401 (0.0251)	4.191 (0.020)	-0.0044 (0.0020)
After 1995	54	0.0119 (0.0112)	-0.0756 (0.0437)	4.896 (0.012)	-0.0067 (0.0027)
Fully Saturated					
75-25 SES gaps (saturated)	77	-0.0078 (0.007)	0.0000 (0.000)	6.473 (0.0003)	0.0055 (0.0015)

Note: n=number of observations; α_1 and α_2 are the trend parameters in Equation 2; the linear model sets α_2 to zero. a. Test for $(\alpha_1 = \alpha_2 = 0)$; b . Estimate of α_1 with $\alpha_2 = 0$. The fully saturated model includes assessment-by-subject-by-age fixed effects.

Table A2. Details of Alternative Estimates of Trends in SES-Achievement Gaps: Varying PCA Inputs and Point Estimates of Gaps

SES calculations	n	α_1 (s.e.)	α_2 (s.e.)	F[a] (p-value)	$\alpha_1 \mid \alpha_2 = 0$ [b] (s.e.)
A. Alternative PCA inputs					
Preferred SES measure	29	0.1015 (0.0494)	-0.0014 (0.0006)	7.380 (0.003)	-0.0103 (0.0036)
Linear education, linear books, home objects in single point	29	0.0449 (0.0275)	-0.0007 (0.0003)	15.906 (0.000)	-0.0098 (0.0020)
Linear education, book dummies, home object dummies	29	0.0870 (0.0487)	-0.0012 (0.0006)	8.320 (0.002)	-0.0116 (0.0035)
Linear education, book dummies, home objects in single point	29	0.0296 (0.0323)	-0.0005 (0.0004)	11.300 (0.000)	-0.0100 (0.0022)
Just books and education dummies	29	-0.0243 (0.0673)	0.0002 (0.0008)	1.634 (0.217)	-0.0081 (0.0045)
Common PCA across time	29	0.0310 (0.0341)	-0.0006 (0.0004)	24.184 (0.000)	-0.0157 (0.0023)
B. Point estimates of SES gaps					
90-10 percentile	52	-0.0027 (0.0263)	0.0000 (0.0004)	0.723 (0.491)	-0.0052 (0.0043)
75-25 percentile	77	0.0210 (0.0169)	-0.0004 (0.0003)	1.484 (0.234)	-0.0032 (0.0036)
70-30 percentile	89	-0.0048 0.0120	0.0000 0.0002	1.017 0.366	-0.0036 0.0025

Note: n=number of observations; α_1 and α_2 are the trend parameters in Equation 2; the linear model sets α_2 to zero. a. Test for $(\alpha_1 = \alpha_2 = 0)$; b . Estimate of α_1 with $\alpha_2 = 0$.

Table A3. Data Used in the Preferred Estimates of the 75-25 SES-Achievement Gaps

TEST	SUBJECT	TEST_YEAR	BIRTHYR	AGE	GAP
ltt naep 13	math	1978	1965	13	0.911871
ltt naep 13	math	1982	1969	13	0.761349
ltt naep 13	math	1986	1973	13	0.695952
ltt naep 13	math	1990	1977	13	0.747969
ltt naep 13	math	1992	1979	13	0.692395
ltt naep 13	math	1994	1981	13	0.755774
ltt naep 13	math	1996	1983	13	
ltt naep 13	math	1999	1986	13	0.813552
ltt naep 13	math	2004	1991	13	
ltt naep 13	math	2008	1995	13	0.623592
ltt naep 13	math	2012	1999	13	0.674944
ltt naep 13	reading	1975	1962	13	0.930947
ltt naep 13	reading	1980	1967	13	
ltt naep 13	reading	1988	1975	13	0.535127
ltt naep 13	reading	1990	1977	13	0.715393
ltt naep 13	reading	1992	1979	13	0.955482
ltt naep 13	reading	1994	1981	13	0.898803
ltt naep 13	reading	1996	1983	13	0.748695
ltt naep 13	reading	1999	1986	13	
ltt naep 13	reading	2004	1991	13	
ltt naep 13	reading	2008	1995	13	0.744306
ltt naep 13	reading	2012	1999	13	0.658676
ltt naep 17	math	1978	1961	17	1.015299
ltt naep 17	math	1982	1965	17	
ltt naep 17	math	1986	1969	17	0.98684
ltt naep 17	math	1990	1973	17	0.845529
ltt naep 17	math	1992	1975	17	0.799241
ltt naep 17	math	1994	1977	17	0.871706
ltt naep 17	math	1996	1979	17	
ltt naep 17	math	1999	1982	17	
ltt naep 17	math	2004	1987	17	
ltt naep 17	math	2008	1991	17	0.603223
ltt naep 17	math	2012	1995	17	0.650335
ltt naep 17	reading	1980	1963	17	0.862473
ltt naep 17	reading	1988	1971	17	0.618087
ltt naep 17	reading	1990	1973	17	0.595193
ltt naep 17	reading	1992	1975	17	0.773108
ltt naep 17	reading	1994	1977	17	0.769742

ltt naep 17	reading	1996	1979	17	0.71538
ltt naep 17	reading	1999	1982	17	
ltt naep 17	reading	2004	1987	17	
ltt naep 17	reading	2008	1991	17	0.605452
ltt naep 17	reading	2012	1995	17	0.671696
naep	math	1990	1976	14	
naep	math	1992	1978	14	0.878988
naep	math	1996	1982	14	
naep	math	2000	1986	14	
naep	math	2005	1991	14	1.123131
naep	math	2007	1993	14	1.11656
naep	math	2009	1995	14	1.125896
naep	math	2011	1997	14	1.115892
naep	math	2013	1999	14	0.975948
naep	math	2015	2001	14	1.04433
naep	reading	1990	1976	14	
naep	reading	1992	1978	14	
naep	reading	1994	1980	14	0.793731
naep	reading	1998	1984	14	0.626363
naep	reading	2002	1988	14	0.837093
naep	reading	2005	1991	14	0.919415
naep	reading	2007	1993	14	0.897687
naep	reading	2009	1995	14	0.888357
naep	reading	2011	1997	14	0.904217
naep	reading	2013	1999	14	0.798552
naep	reading	2015	2001	14	0.797103
pisa	math	2000	1985	15	1.252839
pisa	math	2003	1988	15	1.050082
pisa	math	2006	1991	15	0.952208
pisa	math	2009	1994	15	1.012061
pisa	math	2012	1997	15	0.885231
pisa	math	2015	2000	15	0.770985
pisa	reading	2000	1985	15	1.081603
pisa	reading	2003	1988	15	1.064509
pisa	reading	2009	1994	15	0.968553
pisa	reading	2012	1997	15	0.786681
pisa	reading	2015	2000	15	0.646026
pisa	science	2000	1985	15	1.124869
pisa	science	2003	1988	15	1.079463
pisa	science	2006	1991	15	1.041346
pisa	science	2009	1994	15	0.998195

pisa	science	2012	1997	15	0.847398
pisa	science	2015	2000	15	0.769701
timss	math	1995	1981	14	0.745133
timss	math	1999	1985	14	0.779042
timss	math	2003	1989	14	0.980524
timss	math	2007	1993	14	0.792958
timss	math	2011	1997	14	0.8213
timss	math	2015	2001	14	0.911585
timss	science	1995	1981	14	0.729965
timss	science	1999	1985	14	0.823479
timss	science	2003	1989	14	0.91889
timss	science	2007	1993	14	0.770885
timss	science	2011	1997	14	0.808069
timss	science	2015	2001	14	0.796104